

## Amendment to the Claims

### **Claim 1 (Currently Amended)**

An architecture for Converged Broadband Wireless Communications HАRACTERIZED BY:

- (1) A converged wireless terminal comprising:
  - a) a block radio-frequency and intermediate-frequency and digital broadband transceiver for converting between the base-band signal and the radio frequency, and
  - b) a block base-band signal and control signal processing engine for processing various wireless algorithms and protocols, and
  - c) a Common Air Interface Basic Input/Output System (CAI-BIOS) for the mapping and controlling of different wireless air-interfaces (wireless standards) to the said broadband transceiver and the said processing engine, and
  - d) a SIM (Smart Integrated Memory) card or Memory Stick for the loading of different air interfaces and their software modules to the said CAI-BIOS
- (2) A Common Access Point (CAP) comprising:
  - a) a block radio-frequency and smart antennas and broadband transceiver for converting between the base-band signal and the radio frequency, and
  - b) a block base-band signal and control signal processing engine for processing various wireless algorithms and protocols, and
  - c) a Common Air Interface Basic Input/Output System (CAI-BIOS) for the mapping and controlling of different wireless air-interfaces (wireless standards) to the said broadband transceiver and the said processing engine, and
  - d) a group of software modules providing various air interfaces (wireless standards) to the said CAI-BIOS, and
  - e) a block network interface unit for connecting to the backbone wireline networks.
- (3) An All-IP (Internet Protocol) Packet Division Multiplex (PDM) backbone or core network comprising:
  - a) Any conventional or future PDM network, or
  - b) Any public or private PDM network.

### **Claim 2 (Currently Amended)**

The architecture for Converged Broadband Wireless Communications of claim 1 wherein: said Common Access Point supports anyvarious network interfaces (for example, Fiber Optic, ATM, Ethernet, Digital Subscriber Line, Cable, etc) to the said PDM backbone network through wireline link; said Common Access Point supports anyvarious air interfaces (for example, GSM (Global System for Mobile Communication)/GPRS (General Packet Radio Service), W-CDMA (Wideband Code Division Multiple Access), UMTS (Universal Mobile Telecommunications Service), IEEE 802.11, 802.15, 802.16 and Wireless Local Loop, etc) to the said converged wireless terminal through wireless air link; said converged wireless terminal supports any said air interfaces to the said common access point through wireless air link.

### **Claim 3 (Original)**

The architecture for Converged Broadband Wireless Communications of claim 1 wherein:

said converged wireless terminal and said common access point are all open function units and can be reconfigurable, programmable and software definable; said converged wireless terminal and said common access point can automatically or manually run in any of the said air interfaces subject to the service availability; said common access point can automatically or manually run in any of the said network interfaces subject to the service availability.

#### **Claim 4 (Original)**

The architecture for Converged Broadband Wireless Communications of claim 1 wherein: said converged wireless terminal and said common access point are communicating through All-IP end-to-end direct signaling and protocol; said converged wireless terminal and said common access point support integrated services of voice, data and video over All-IP protocol and signaling.

#### **Claim 5 (Currently Amended)**

The architecture for Converged Broadband Wireless Communications of claim 1 wherein: said CAI-BIOS performs the mapping and controlling between said different air interfaces and the said open base-band/control processing engine, the said broadband transceiver as well as the said radio frequency unit of the said converged wireless terminal and the said common access point; said CAI-BIOS is the key unit of the said converged wireless terminal and the said common access point; said CAI-BIOS provides information on said air interfaces including necessary transmission parameters, modulation parameters, channel parameters, access control parameters, dynamic bandwidth allocation parameters and other specific air interface parameters.

#### **Claim 6 (Currently Amended)**

The architecture for Converged Broadband Wireless Communications of claim 2 wherein: said air interfaces modules said software modules that provide said air interfaces to said CAI-BIOS in said common access point can be stored in said common access point disks or uploaded from the said PDM backbone networks or uploaded from other remote networks; said air interfaces modules said software modules that provide said air interfaces to said CAI-BIOS in said converged wireless terminal can be loaded in said SIM card or memory stick.

#### **Claim 7 (Canceled)**

#### **Claim 8 (Currently Amended)**

A sample product of said the converged broadband wireless terminal CHARACTERIZED BY:

- a) Air Interfaces Options (automatically or manually), and
- b) Security (finger print, etc), and
- c) Information recognition (voice recognition, pattern recognition, etc)
- d) Bandwidth on Demand (Quality of Service Centric)
- e) SIM card or memory stick

## Amendment to the Claims

### Claim 1 (Currently Amended)

An open wireless architecture (OWA) for fourth generation mobile communications said system comprising:

- a) a wireless communication terminal device supporting various different wireless standards (air interfaces) in the same device with same unique identifier and capable of communicating with other devices, systems or networks through a wireless medium or ~~over the air network~~,
- b) an advanced computer system equipped with full networking facilities to access various different backbone networks either through wireline networking interfaces or ~~sometimes~~ through broadband wireless access systems,
- c) an advanced transceiver system supporting various different air interfaces to interconnect said wireless communication terminal device, ~~etc~~ through the air link,
- d) said transceiver system connected to said computer system to construct the base-station as a whole,
- e) said wireless terminal device ~~can also connect~~ to different wireline networks through its networking interfaces in the said wireless terminal device,
- f) said base-station ~~can connect~~ to other base-station either over the wireline networks or over broadband wireless access system through said computer system, or by over-the-air networks through said transceiver system,
- g) said wireless terminal device ~~can also connect~~ to other wireless terminal device through the air link in an ad-hoc mode ~~in case of special situations~~.

### Claim 2 (Currently Amended)

The Open Wireless Architecture (OWA) for fourth generation mobile communications of claim 1 wherein: both said wireless terminal device and said base-station further comprising:

- a) an open processing engine to process the signals and protocols of various different air-interfaces (~~including user defined air interface~~) for over-the-air networking and transmission,
- b) a reconfigurable digital converter to transform the received signals to the digital base-band signals and vice versa, and connected to said open processing engine,
- c) a programmable radio frequency (RF) module and smart antenna processing module of different frequencies to support different air-interfaces, and connected to said digital converter,
- d) a software definable module (SDM) containing parameters, algorithms and protocols; ~~etc~~ of some wireless air-interfaces to be stored in an external memory card or downloaded from networks,
- e) an open wireless BIOS (basic input/output system) structure capable of providing the common and open interfaces to said processing engine, said digital converter, said RF module and said SDM, ~~etc~~.

### Claim 3 (Currently Amended)

The Open Wireless Architecture (OWA) for fourth generation mobile communications of claim 1 wherein: both said wireless terminal device and said base-station further comprising:

- a) a system software module ~~to supporting~~ dynamic spectrum management, spectrum sharing and resource management to increase spectrum efficiency and optimize the system performance,
- b) a convergence layer module ~~to convergeing~~ wireline and wireless networks and services, as well as transmission convergence,~~etc~~,
- c) a configuration management module ~~to enableing~~ flexible system re-configuration when wireless air-interfaces ~~changeing~~, wireline networking ~~changesing~~ or system settings ~~changeing~~,~~etc~~.

**Claim 4 (Currently Amended)**

A system as recited in claim 1 wherein said wireless terminal device capable of system software running upon the system hardware directly while the application soft-ware executing on the real-time OS (operating system) standards through said open wireless BIOS.

**Claim 5 (Currently Amended)**

A system as recited in claim 2 wherein said open processing engine decodes, de-channelizes and demodulates the base-band channel signals and control signals of said various air-interfaces into detailed digital signaling, traffic and control information,~~and vice versa~~.

**Claim 6 (Currently Amended)**

A system as recited in claim 1 wherein said base station can be reconfigured and re-programmed as wireless router, mobile soft switch or wireless gateway,~~etc~~.

**Claim 7 (Currently Amended)**

A system as recited in claim 1 wherein said base station can be reconfigured to be ~~portable and/or mobile as well~~ for military applications or special industrial applications.~~In that case, that~~ the said computer system connectsing to the backbone networks through said broadband wireless access systems instead of said wireline networking interfaces.

**Claim 8 (Original)**

A system as recited in claim 1 wherein said wireless terminal device and said base-station can communicate each other over said various different air interfaces including time-division multiple access (TDMA), code-division multiple access (CDMA), frequency-division multiple access (FDMA) or other user-defined interfaces.

**Claim 9 (Original)**

A method as recited in claim 8 detecting said various different air-interfaces for said wireless terminal device and said base-station, said method comprising:

- a) performing initial channel processing from the received signals, or
- b) scanning frequency carrier from the received signals, or
- c) performing different decoding scheme from the received signals, or
- d) performing different demodulation scheme from the received signals, or
- e) running user-defined detecting technologies.

**Claim 10 (Currently Amended)**

A method as recited in claim 1 connecting said transceiver system and said computer system through open software structures, comprising:

- a) open operating systems supporting Windows, Linux or user-defined,
- b) open resource management covering spectrum, bandwidth, channels, capacity, processors, power, storage and services, ~~etc~~,
- c) open communication application software enabling user-friendly programming and services,
- d) common objects library and functional components defining the converged processing elements,
- e) open configuration management supporting system reconfiguration in base-band parts, RF parts, antenna parts and networking parts, ~~etc~~.

**Claim 11 (Currently Amended)**

A system as recited in claim 2 wherein said open wireless BIOS defining the basic interface structure for the said various different air-interfaces/wireless standards ~~(either common standards or user-defined)~~, said ~~standards~~ air-interfaces switching, said functional modules as well as switching between internal and/or external said modules, ~~etc~~.

**Claim 12 (Currently Amended)**

A method as recited in claim 2 providing a smart antenna processing module for said OWA system, said method comprising:

- a) using antenna arrays to process radio signals in both space, ~~not only~~ and time, to improve performance in presence of wireless fading and interference,
- b) using beamforming algorithm to increase received signal-over-noise-rate (SNR) for desired directions,
- c) using diversity algorithm to combat fading in order to work at less SNR,
- d) using interference mitigation method to maximally reuse the channel frequencies,
- e) using spatial multiplexing algorithms to increase data speeds, for example, MIMO (multiple-in and multiple-out), ~~etc~~ (MIMO).

**Claim 13 (Currently Amended)**

A system as recited in claim 2 wherein said software definable module in said wireless terminal device can be stored in or installed from said external memory card ~~(or SIM card)~~, or downloaded from any available networking facilities of said wireless terminal device.

**Claim 14 (Currently Amended)**

A method as recited in claim 3 providing a convergence layer module for said OWA system, said method comprising:

- a) open service convergence including transparent integrated services across both wireline and wireless networks, ~~etc~~,
- b) open transport convergence including IP (internet protocol) ~~(IP)~~ enterprise convergence and All-IP end-to-end convergence, ~~etc~~,
- c) open transmission convergence including adaptive modulation, adaptive coding and adaptive equalization, ~~etc~~.

**Claims 15-20 (Canceled)**